Agricultural Production

(SIC 01, 02)

SIGNIFICANT POINTS

- Commercial farms make up about one-fourth of all agricultural establishments, yet generate approximately 90 percent of total agricultural output.
- Self-employed workers—mostly farmers—account for more than half of the industry's workforce.
- Employment in agricultural production is expected to continue its long-term decline.

Nature of the Industry

Agricultural production, or farming and ranching, has long been a mainstay of the Nation's economy, successfully feeding and clothing the domestic population as well as exporting agricultural goods around the world. Once a labor intensive industry, providing jobs for at least 12 percent of the workforce as late as 1950, both agricultural employment and the number of farms have dropped significantly in recent decades because of mechanization and other technological improvements. Although approximately one-third the number of farms exists today as compared to 50 years ago, output has more than doubled, exports of agricultural goods continue to contribute positively to the trade balance, and agricultural production remains one of the Nation's top 10 industries in terms of total employment.

Thanks to generally temperate climates, rich soil, and a variety of growing conditions, the agricultural sector produces an abundance and wide selection of goods. The industry is roughly divided into two major segments: livestock production, including animal specialties; and crop production. *Livestock production* includes establishments that raise livestock, such as beef cattle, sheep, and hogs; dairy farms; poultry and egg farms; and farms, such as apiaries (bee farms) and aquaculture, that raise animal specialties. *Crop production* includes the growing of cash grains, such as wheat, corn, and barley; field crops, such as cotton and tobacco; vegetables and melons; fruits and nuts; and horticultural specialties, such as flowers and ornamental plants.

About 2.2 million establishments make up the agricultural production industry. According to the U.S. Department of Agriculture, an establishment must sell at least $1,000 worth of produce per year to qualify as a farm. Establishments selling between $1,000 and $50,000 are known as *noncommercial farms*, while those selling more than $50,000 are identified as *commercial farms*. Noncommercial farms account for about three-fourths of all farms, many of which are individually owned family farms. Commercial farms, though substantially fewer in number, are much larger in size and generate about 90 percent of total agricultural sales.

Production of some types of crops and livestock tend to be concentrated in particular regions of the country, based on the growing conditions and the topography. For example, the warm climates of Florida and Southern California are best suited for citrus fruit production. The Southern States are the major growers of tobacco, cotton, rice, and peanuts. In the Northeast, from Maine to New Jersey, blueberries, maple syrup, and apples are major agricultural products. Cranberry bogs are mainly found in Massachusetts and Wisconsin. Hogs, grains, potatoes, and range-fed cattle are major products in the Plains States. In the Southwest and West, ranchers raise beef cattle. In Washington State, apples are an important crop; in California grapes for wine are prominent, as well as most vegetables and fruits. Poultry and dairy farms tend to be found in most areas of the country.

The nature of the work in the agricultural production industry varies depending on the type of product. Consumption of, and demand for, cash grains tend to be strong and steady, and they comprise a substantial part of agricultural output. They are generally grown in large-scale operations in several areas in the Nation, but particularly the Midwest. During the planting, growing, and harvesting seasons, workers are busy for long hours plowing, disking, harrowing, seeding, fertilizing, and harvesting. Fieldwork on large farms consisting of hundreds, sometimes thousands, of acres is often done using massive, climate-controlled tractors and other modern agricultural equipment. In some cases, "teams" of operators with tractors, combines, or other agricultural equipment travel from one farm to another during harvest time in a practice known as "custom harvesting."

Small-scale establishments are more common in the Northeast as compared to the larger establishments elsewhere in the country, particularly the Southwest and West. However, these small farms in States with limited growing seasons cannot provide produce for markets during the months of late fall, winter, and early spring. Therefore, the majority of fresh vegetables is grown on large farms in California, and shipped throughout the country. Vegetables are generally still harvested manually by groups of migrant farm workers, although new machines have been developed to replace manual labor for some fruit crops. Vegetable growers on large farms of approximately 100 acres or more usually practice "monoculture," large-scale cultivation of one crop on each division of land.

Dairy farms provide the nation with a variety of products, including milk, cheese, butter, and ice cream. Dairy farming requires outdoor, as well as indoor, work. Farmers, farm managers, and farm workers must feed cows, heifers, and calves, clean their stalls, and take them outside to pastures for exercise and grazing. Workers may also plant, harvest, and store

several crops to feed the cattle through the cold of winter or the drought of summer.

Though the nature of the work on large ranches in the West and Southwest still entails the kind of activities—such as branding and herding—often seen in cowboy movies, the use of modern equipment and technology has changed the way the work is done. Branding and vaccinating of herds, for example, are largely mechanized. The work on such establishments still tends to be seasonal and to take place largely outdoors. Common activities include raising feed crops, rotating cattle from one pasture to another, and keeping fences in good repair. But the use of trucks, portable communications gear, and geopositioning equipment is now common and saves valuable time for livestock ranchers.

Poultry and egg farms are, for the most part, large operations resembling production lines. With the exception of free-range farms, where fowl are allowed some time outside during the day for exercise and sunlight, poultry production involves mainly indoor work, with workers performing a limited number of specific tasks repeatedly. Because of increased mechanization, poultry growers can raise chickens by the hundreds—sometimes the thousands—under one roof. Eggs still are collected manually in some small-scale hatcheries, but in larger hatcheries eggs tumble down onto conveyor belts. Machines then wash, sort, and pack the eggs into individual cartons. From there, workers place the cartons into boxes and stack the boxes onto pallets.

On aquaculture farms, farmers raise fish and shellfish in salt, brackish, or fresh water—depending on the requirements of the particular species—usually in ponds, floating net pens, raceways, or recirculating systems. They stock, feed, protect, and otherwise manage aquatic life sold for consumption or used for recreational fishing. Horticulture farms raise ornamental plants, bulbs, shrubbery, sod, and flowers. Although much of the work takes place outdoors, in seasonal climates much production also takes place in greenhouses or hothouses.

Some agricultural establishments cater directly to the public. For example, some fruit and vegetable growers use the marketing strategy of "pick-your-own" produce, or set up roadside stands. Nurseries and greenhouses, which grow everything from seedlings to sod, also provide products directly to individual consumers as well as to retail establishments and other industries.

Working Conditions

Agricultural production attracts people who enjoy an independent lifestyle and working with animals or outdoors on the land. For many, the wide-open physical expanse, the variability of day-to-day work, and the rural setting provide benefits that offset the sometimes hard labor, the danger that unseasonable or extreme weather may stunt or ruin crops, and the risk that unfavorable commodity prices may lower income.

Although the working conditions vary by occupation and setting, there are some characteristics common to most agricultural jobs. Hours are generally uneven and oftentimes long; work can't be delayed when crops must be planted and harvested, or when animals must be sheltered and fed. Weekend work is common, and farmers, farm managers, crew leaders, farm equipment operators, and farm workers may work a 6- or 7-day week during planting and harvesting seasons. More than 1 out of 4 employees in this industry work variable schedules compared to less than 1 in 10 workers in all industries combined. Since much of the work is seasonal in nature, many farm workers must cope with the difficulty in obtaining year-round, full-time employment. Migrant farm workers, who move from location to location as crops ripen, live an unsettled lifestyle, which can be stressful.

Much farm and ranch work takes place outdoors in all kinds of weather and is physical in nature. Harvesting vegetables, in particular, requires manual labor, and workers do much bending, stooping, and lifting. Some field workers may lack adequate sanitation facilities, and their drinking water may be limited. The year-round nature of much livestock production work means that ranch workers must be out in the heat of summer, as well as the cold of winter. Those who work directly with animals risk being bitten or kicked.

Farmers and farm workers in crop production risk exposure to pesticides and other potentially hazardous chemicals that are sprayed on crops or plants. Those who work on mechanized farms must take precautions when working with tools and heavy equipment to avoid injury. Farmwork has long had one of the highest incidences of illnesses and injuries of any industry. In 1997, crop production had 9.1 injuries and illnesses per 100 full-time workers compared to an average of 7.1 throughout private industry.

Employment

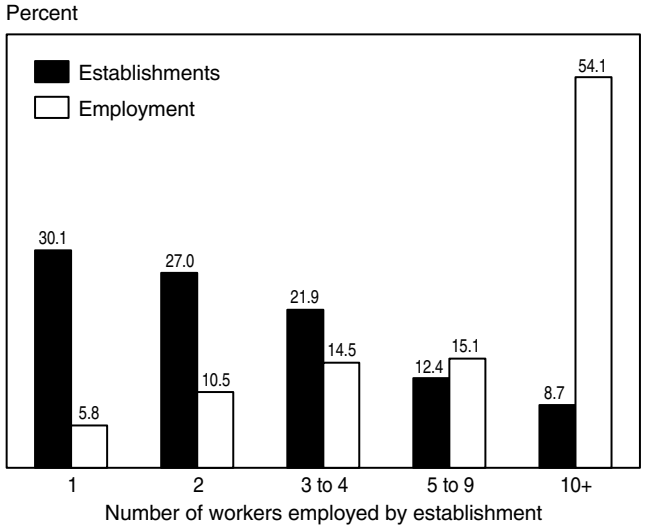
In 1998, agricultural production employed a total of about 2.5 million workers, making it one of the largest industries in the Nation. This industry is unusual in that self-employed workers account for a slight majority of its workforce. Among all occupations, just over half—about 1.3 million—are self-employed; nearly 1.2 million wage and salary workers and 35,000 unpaid family workers make up the remainder.

For wage and salary workers, the single most common occupation was that of farm workers, who made up nearly 25 percent of the overall workforce. The majority of self-employed workers were farmers, accounting for approximately 52 percent of total employment in this industry. Agricultural production is one of the few remaining areas of the economy where unpaid family workers remain a significant part of the workforce. Most unpaid family workers on farms assist with the farm work, but a small number do bookkeeping and accounting or act as farmers.

Employment is fairly evenly distributed between livestock production and crop production, with livestock-producing establishments employing about 55 percent of all workers and crop-producing establishments employing 45 percent. Establishments specializing in ornamental nursery products employed the largest number of workers in 1997, followed by vegetable and melon producing farms and fruit orchards. Crop farms, dairy farms, and vineyards also employed a significant number of workers. Most individual agricultural production establishments, however, employ fewer than 10 workers (chart).

Workers in agricultural production tend to be slightly older than the workers in other industries. In livestock production, for example, about half of the workers are over the age of 44, compared to about one-third, on average, in all industries. In agricultural production, the median age was significantly higher, 43, than for workers in all other industries, 39, probably reflecting the strong attachment that self-employed farmers have to their occupation.

Few agricultural production establishments employ 10 or more workers



Source: U.S. Department of Agriculture, *Census of Agriculture*, 1997

Occupations in the Industry

It takes several kinds of occupational specialties—from bookkeepers, accountants, and auditors to mechanics and repairers—to keep the industry functioning (table 1). However, despite upgrades in technology, new forms of machinery, and the complex financial records that must be kept, three occupations still compose the overwhelming majority of workers in agricultural production: Farmers, farm managers, and farm workers.

Farmers are the self-employed owner-operators of establishments that produce agricultural output. Their work encompasses numerous tasks. They keep records of their animals' health, crop rotation, operating expenses, major purchases, bills paid and income due, as well as pay bills and file taxes. Computer literacy has become as necessary for farmers as it has for many other occupations.

Farmers must have additional skills to keep a farm operating day-in and day-out. A basic understanding and working knowledge of mechanics, carpentry, plumbing, and electricity are all helpful, if not essential, for running a farm. The ability to maintain and repair equipment and facilities is important to keep costs down and the farm running smoothly.

Farmers who work large commercial farms for cash crops make decisions as much as a year in advance about which crop to grow. Therefore, a farmer must be aware of prices in national and international markets to use for guidance, while tracking the costs associated with each particular crop. When dealing in hundreds or thousands of acres of one crop, even small errors in judgment are magnified, so the impact can be substantial. Thus, large-scale farmers strive to keep costs to a minimum in every phase of the operation. Furthermore, risk management of portfolios—the practice of juggling stocks, buying and selling futures, and engaging in other paper deals like bond trading—is now becoming more important for farmers of large commercial farms.

Farm managers operate the farm on a daily basis for the owners. Large commercial farms may have a manager for different operations within the establishment. On smaller farms, farm managers oversee all operations. They purchase the inputs used in the farm's production: Machinery, seed, fertilizers, herbicides and pesticides, fuel, and labor. They must be aware of any laws that govern the use of such inputs in the farm's locality. Additionally, they may hire and oversee other farm employees as they plow, disk, harrow, plant, fertilize, harvest, and care for livestock. Farm managers must be knowledgeable about crop rotation, soil testing, and various types of capital improvements necessary to maximize crop yields.

Farm managers perform many of the functions of farmers themselves, with the added tasks of managing the schedules and work of the employees. They assign, monitor and assess individuals' performances day-in and day-out. They may keep in order all the paperwork needed to satisfy legal requirements, including keeping payroll records and state and Federal tax records.

Farm workers perform the whole spectrum of daily chores involved in crop or livestock production. On nurseries they plant seedlings, transplant saplings, and water and trim plants. On crop farms they may manually plant, cultivate, and harvest vegetables, fruits, nuts, and field crops using hand tools such as shovels, trowels, hoes, tampers, pruning hooks, shears, and knives. Among their duties are tilling soil and applying fertilizers; transplanting, weeding, thinning, or pruning crops; applying fungicides, herbicides, or pesticides; and packing and loading harvested products. They also may repair fences and farm buildings, or keep irrigation equipment functioning. Some farm workers attend to farm or ranch animals such as sheep, cattle, goats, hogs, and poultry. They clean and maintain animal housing areas; feed, water, herd, brand, weigh, and load animals; shear wool from sheep; collect eggs from hatcheries; tend dairy milking machines; and shoe animals.

Farm equipment operators handle the tractors and equipment used for plowing, sowing, and harvesting on large-scale establishments. Teams of such operators may travel throughout the Plains States during harvest time, working long hours each day in order to reap as quickly as possible while the nutrients in the grains are at their fullest. On establishments of smaller scale, farm equipment operators handle field work of different types using machinery such as fertilizer spreaders, haybines, raking equipment, balers, combines, and threshers.

Training and Advancement

The agricultural production industry is characterized by a large number of workers with low levels of educational attainment. More than one-third of this industry's workforce does not have a high school diploma, compared to only 13 percent of all workers in other industries. The proportion of workers without a high school diploma is particularly high in the crop production sector, where there are more labor-intensive establishments employing migrant farm workers.

Training and education requirements for general farm workers are few. Some experience in farm or ranch work is beneficial, but most tasks require manual labor and are learned fairly quickly on-the-job. Advancement for farm workers is limited. Motivated and experienced farm workers may become crew leaders or farm labor contractors. Farm workers who wish to become independent farmers first must buy or rent a plot of land.

Table 1. Employment of wage and salary workers in agricultural production by occupation, 1998 and projected change, 1998-2008

(Employment in thousands)

Occupation	1998 Employment Number	Percent	1998-2008 Percent change
All occupations	1,163	100.0	-11.2
Agriculture, forestry, and fishing	1,030	88.5	-10.9
Farm workers	606	52.1	-14.3
Farm managers	164	14.1	-0.1
Landscaping, groundskeeping, nursery, greenhouse, and lawn service occupations	54	4.6	-9.6
Supervisors, farming, forestry, and agricultural related occupations	28	2.4	-14.5
Operators, fabricators, and laborers	40	3.4	-9.1
Truckdrivers	18	1.6	-8.6
Machine setters, set-up operators, operators, and tenders	8	0.7	-7.2
Helpers, laborers, and material movers, hand	5	0.5	-12.3
Hand workers, including assemblers and fabricators	5	0.4	-10.3
Administrative support, including clerical	33	2.8	-18.9
Bookkeeping, accounting and auditing clerks	13	1.1	-19.5
Secretaries	8	0.7	-25.9
Precision, production, craft and repair	22	1.9	-14.2
Mechanics, installers and repairers	14	1.2	-13.8
Executive, administrative, and managerial	14	1.2	-12.7
Service	11	0.9	-18.1
All other occupations	14	1.2	-8.8

Becoming a farmer generally does not require formal training or credentials. However, knowledge and expertise about agricultural production are essential to success for prospective farmers. The traditional method for acquiring such knowledge is through growing up on a farm. This method is becoming less and less common as the percentage of the U.S. population raised on farms continues to dwindle. But even with a farming background, a person considering farming would benefit from the formal schooling offered by land-grant universities in each State. Programs usually incorporate hands-on training into curricula that complements the academic subjects. Typical coursework covers the agricultural sciences (crop, dairy, and animal) and business subjects such as accounting and marketing.

Experience and some formal education are necessary for farm managers. A bachelor's degree in business with a concentration in agriculture provides a good background. Work experience in the different aspects of farm operations enhances knowledge and develops decision-making skills, which further qualifies prospective farm managers. The experience of having performed routines on other farming establishments in the capacity of a farm worker may save managers valuable time in forming daily or monthly workplans and in avoiding pitfalls that could result in financial burdens for the farm.

Whether gained through experience or formal education, both farmers and farm managers need enough technical knowledge of crops, growing conditions, and plant diseases to make sound scientific and financial decisions. A rudimentary knowledge of veterinary science, as well as animal husbandry, is important for dairy and livestock farmers and farm managers.

It also is crucial for farmers and farm managers to stay abreast of the latest developments in agricultural production. They may do this by reviewing agricultural journals that publish information about new cost-cutting procedures, new forms of marketing, or good results with new techniques. County cooperative extension agencies serve as a link between university and government research programs and farmers and farm managers, providing the latest information on numerous agricultural-related subjects. County cooperative extension agents may demonstrate new animal breeding techniques, or more environmentally safe methods of fertilizing, for example. Other organizations provide information—through journals, newsletters, and the Internet—on agricultural research and the results of implementing innovative methods and ideas.

Some private organizations are helping to make farmland affordable for new farmers through a variety of institutional innovations. The Land Link program, run by the Center for Rural Affairs, matches old farmers up with young. In the matching process, farmers approaching retirement arrange to pass along their land to young farmers wishing to keep the land under cultivation. The Center for Rural Affairs also operates a private loan program for first-time buyers, as well as a program, the Rural Investment Corporation, designed to give beginning farmers an equal opportunity for farm credit.

Earnings

In 1998, median earnings for workers in agricultural production were $299 per week, substantially lower than the median of $523 for all workers in private industry. In fact, only the highest 10 percent of workers in agricultural production earned more than $582. Lower than average earnings are due in part to the low level of skill required for many of the jobs in the industry and the seasonal nature of the work.

Farm income can vary substantially, depending on a number of factors, including: the type of crop or livestock being raised, price fluctuations for various agricultural products, and weather conditions that affect yield. For many farmers, particularly those working non-commercial farms, crop or livestock production is not their major occupation or source of income.

Outlook

The expanding world population should lead to a rise in demand for food and fiber. Demand for U.S. agricultural exports is expected to grow in the long run as developing nations improve their economies and personal incomes. However, increasing productivity in the highly efficient U.S. agricultural production industry is expected to meet domestic consumption needs and export requirements with fewer farms and less farm labor than in the past. Furthermore, market pressures may continue to lead to the consolidation of many farms. The trend toward fewer and larger farms is expected to continue through the 1998-2008 period, result-

ing in an 18 percent decline of overall employment in agricultural production. The decline will be fastest, at 24 percent, among self-employed workers, most of whom are farmers. Employment of wage and salary workers will decline half as slowly as the self-employed.

In recent decades, new technology in the form of larger and more efficient farm machinery, computerization of farm equipment and financial systems, and biotechnology methods have resulted in higher yields and increased productivity. Further technological improvements will continue to boost output between 1998 and 2008.

Federal Government subsidy payments traditionally have shielded many agricultural producers from the ups and downs of the market. Currently, both domestic and international official policy is to open up the industry to competitive forces. As European producers face the loss of price supports in the marketplace, prices of European agricultural goods should drop, meaning increased competition for U.S. farmers. In the United States, the 1996 Federal Agriculture Improvement and Reform Act (also known as the 1996 Farm Act) phases out price supports for agricultural produce such as wheat, corn, grain sorghum, barley, oats, rice, and upland cotton. Farm establishments that grow such crops may experience heavy fluctuations in incomes as they deal with the adverse affects of climate and price changes. Dairy farming also will be affected by the 1996 Farm Act. Starting in the year 2000, government price supports for milk will disappear and milk prices will be determined by market forces. Under these conditions, the larger and more financially sound farms will be best able to cope with international and competitive forces. Owners of farms that do not have sufficient funds to withstand the changes in the marketplace and still cover all operating costs may eventually be forced to consolidate with larger operations or leave agricultural production altogether. However, the initial effects of the 1996 Farm Act may lead to reconsideration of Federal agricultural policies, and some aspects of the 1996 legislation may eventually be revised.

Employment on many farms will most likely continue to be characterized by low wages and lack of benefits. This, combined with continuously rising agricultural productivity, should translate into a further reduction in the workforce. Employment of farmers, farm managers and farm workers are all projected to decrease.

Employment declines resulting from growing productivity and consolidations might be counterbalanced somewhat by other changes taking place in the agricultural production industry. Dairy and other farms may increasingly turn to programs conducted by State and local governments that allow farmers to sell the development rights to their property. This immediately lowers the market value of the land and the property taxes along with it, making farming more affordable. New developments in marketing milk and other agricultural produce through farmer-owned and operated cooperatives hold out promise for many in the agricultural production industry. Also, demand for organic farm produce is increasing as consumers become more conscious about the pesticides and fertilizers used in conventional agriculture, allowing farms of small acreage—which only 10 years ago appeared to have almost no future as working farms—to remain economically viable.

Sources of Additional Information

For general information about academic programs and aquaculture, contact:

- The Alternative Farming Systems Information Center (AFSIC), 10301 Baltimore Ave., Room 304, Beltsville, MD 20705-2351. Internet: **http://www.nal.usda.gov/afsic**

For information about Community Supported Agriculture and internships in organic farming, contact:

- The Biodynamic Farming and Gardening Association, Inc., Building 1002B, Thoreau Center, The Presdio, P.O. Box 29135, San Francisco, CA 94129-0135. Internet: **http://www.biodynamics.com**
- Appropriate Technology Transfer for Rural Areas, P.O. Box 3657, Fayetteville, AR, 72702. Internet: **http://www.attra.org**

For information on a career as a farm manager, contact:

- American Society of Farm Managers and Rural Appraisers, 950 South Cherry St., #508, Denver, CO 80222. Internet: **http://www.agri-associations.org/asfmra**

For information on the Land Link Program, contact:

- Center for Rural Affairs, P.O. Box 46, Walthill, NE 68067.

For information about State agencies that are involved in the purchases of development rights of farmland, contact:

- American Farmland Trust, 1200 18th Street, NW., Washington, DC 20036. Internet: **http://www.farmland.org**

Information on the following occupations may be found in the 2000-01 *Occupational Outlook Handbook*:

- Farmers and farm managers
- Landscaping, groundskeeping, nursery, greenhouse, and lawn service occupations
- Bookkeeping, accounting, and auditing clerks